



## High-Performance, Water-Based Ceiling Coating Improves Tunnel Visibility, Safety and Aesthetics

Changwon Tunnel maintenance team relies on new Kynar Aquatec® resin-based topcoat to achieve long-term durability, cleanliness and service life.

The four-lane Changwon Tunnel is located on road number 1020 in the South Gyeongsang Province of South Korea. The tunnel's twin bores through the mountain are each approximately 7,677 feet (2340 m) long, 31 feet (9.4 m) wide and 15 feet (7.6 m) high (as measured from the roadway to the top of the tunnel arch). Southbound traffic experiences a significant descending gradient inside the tunnel, while northbound traffic experiences a corresponding ascending gradient. The two-lane descending tunnel was opened in 1993 and the two-lane ascending tunnel was opened in 1997.

### Need to Improve Tunnel Visibility and Safety

The light-reflecting characteristics of a ceiling finish enhance the overall efficiency and effectiveness of tunnel interior lighting systems. The presence of moisture and engine exhaust products in the tunnel—especially emissions from diesel power trucks—creates an atmosphere that can darken unfinished surfaces, detracting from their light-reflecting qualities and the aesthetic impression it leaves upon users.



### Project:

Changwon Tunnel, South Korea

### Coating:

AKUAFLON® coating

### Coating Supplier:

AK Chemtech Company, LTD

The evaluation and selection process for tunnel finish materials must therefore consider reflectivity, adaptability, cleanability, durability and public safety considerations.

To improve illumination, visibility, cleanliness and safety within the Changwon Tunnel, the team responsible for maintaining the structure decided to paint the unfinished ceiling, which was dulling as a result of dirt and other airborne pollutants. Because the coating was to be applied inside the tunnel, the use of a low-VOC water-based coating was a key requirement. Other important coating performance characteristics desired were long-term durability, ability to resist dirt pick-up, biological growth accumulation, and other weathering factors, and retention of reflective value and color.

### A Clear Choice

The process for selecting a high-performance coating for the tunnel's ceiling started with a study over several months by AK Chemtech of nine different coating systems from various manufacturers, including Fluoroethylene vinyl ether (FEVE) resin-based coatings, polyurethane (PU) coatings and various waterborne acrylic coatings. The test results clearly showed that a new water-based PVDF coating, called AKUAFLON®, outperformed the other coatings in resisting dirt buildup.

Based on the study's findings and other performance considerations, the maintenance team decided that the AKUAFLON® product from AK Chemtech would be the ceiling topcoat of choice for achieving the specific goals for the Changwon Tunnel project.

AKUAFLON® coating is based on Kynar Aquatec® PVDF technology, an innovative platform of emulsions for producing ultra-durable water-based coatings that can be formulated with VOC levels below 100 grams/liter. Coatings containing these emulsions provide the long-lasting durability and excellent weatherability benefits of traditional Kynar 500® resin-based coatings and can easily be applied to a variety of substrates. Another benefit of the Kynar Aquatec® resin-based AKUAFLON® coating is its exceptional resistance to dirt pickup and biological growth that can reduce reflectivity.

The statements, technical information and recommendations contained herein are believed to be accurate as of the date hereof. Since the conditions and methods of use of the product and of the information referred to herein are beyond our control, ARKEMA expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information; NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE GOODS DESCRIBED OR THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be applicable when such product is used in combination with other materials or in any process. The user should thoroughly test any application before commercialization. Nothing contained herein constitutes a license to practice under any patent and it should not be construed as an inducement to infringe any patent and the user is advised to take appropriate steps to be sure that any proposed use of the product will not result in patent infringement. See SDS for Health & Safety Considerations. Arkema has implemented a Medical Policy regarding the use of Arkema products in Medical Devices applications that are in contact with the body or circulating bodily fluids: (<http://www.arkema.com/en/social-responsibility/responsible-product-management/medical-device-policy/index.html>).

Arkema has designated Medical grades to be used for such Medical Device applications. Products that have not been designated as Medical grades are not authorized by Arkema for use in Medical Device applications that are in contact with the body or circulating bodily fluids. In addition, Arkema strictly prohibits the use of any Arkema products in Medical Device applications that are implanted in the body or in contact with bodily fluids or tissues for greater than 30 days. The Arkema trademarks and the Arkema name shall not be used in conjunction with customers' medical devices, including without limitation, permanent or temporary implantable devices, and customers shall not represent to anyone else, that Arkema allows, endorses or permits the use of Arkema products in such medical devices. It is the sole responsibility of the manufacturer of the medical device to determine the suitability (including biocompatibility) of all raw materials, products and components, including any medical grade Arkema products, in order to ensure that the final end-use product is safe for its end use; performs or functions as intended; and complies with all applicable legal and regulatory requirements (FDA or other national drug agencies) It is the sole responsibility of the manufacturer of the medical device to conduct all necessary tests and inspections and to evaluate the medical device under actual end-use requirements and to adequately advise and warn purchasers, users, and/or learned intermediaries (such as physicians) of pertinent risks and fulfill any postmarket surveillance obligations. Any decision regarding the appropriateness of a particular Arkema material in a particular medical device should be based on the judgment of the manufacturer, seller, the competent authority, and the treating physician.

Kynar®, Kynar 500® and Kynar Aquatec® are registered trademarks of Arkema Inc.

Akuafilon® is a registered trademark of AK Chemtech Company, LTD.

© 2016 Arkema Inc. All rights reserved.

[kynaraquatec.com](http://kynaraquatec.com)

#### Contact Information

China: +86 21 61476888  
Japan: +81 3 5251 9900  
Korea: +82 2 370367000  
Singapore: +65 64199199  
Taiwan: +886 2 27476979  
India: +91 22 24387504

#### Arkema Inc.

900 First Avenue  
King of Prussia, PA 19406  
USA  
Tel.: (+1) 610-205-7000  
[arkema-inc.com](http://arkema-inc.com)

#### Headquarters: Arkema France

420, rue d'Estienne d'Orves  
92705 Colombes Cedex – France  
Tel.: +33 (0)1 49 00 80 80  
Fax: +33 (0)1 49 00 83 96  
[arkema.com](http://arkema.com)

**ARKEMA**  
INNOVATIVE CHEMISTRY